VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

BASIC COURSE INFORMATION WITHIN THE STUDY PROGRAMME

PROFESSIONAL UNDERGRADUATE STUDY PROGRAMME

COMPUTER SYSTEMS MAINTENANCE

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Algorithms and Data Structures

Course Code:
ORS109

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
1	2 + 3 + 0	75	5

Course Objective:
To acquire fundamental knowledge of simple and dynamic data structures, master basic algorithms, and develop the ability to apply the acquired knowledge in solving algorithmic problems.

Course Content:
Primitive and complex data types. Introduction to object-oriented programming. Theoretical and experimental analysis of algorithms. Sorting. Searching. Recursive algorithms. Lists and arrays. Stack and queue. Tree. Hash functions and direct addressing.

Learning Outcomes:
After successfully completing this course, students will be able to:

1. Describe basic search and sorting algorithms and fundamental data structures.
2. Recognize built-in data structures and algorithms in programming languages.
3. Evaluate the efficiency of algorithms and data structures.
4. Write program solutions using object-oriented programming techniques.
5. Apply the optimal type of data structure when solving complex problems.
6. Apply the optimal type of search or sorting algorithm in solving programming problems.

Required Literature:

1. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser. Data Structures and Algorithms in Python. John Wiley & Sons, 2013.
2. Peter Wentworth, Jeffrey Elkner, Allen B. Downey, and Chris Meyers. Learn Python the Right Way – How to Think Like a Computer Scientist. Ritza, 2022.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Databases

Course Code:
ORS114

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
3	3 + 2 + 0	75	6

Course Objective:
To provide students with knowledge about the concept of databases and the possibilities of using relational databases within an information system.

Course Content:
Basic concepts. Database management systems. Relational databases. Fundamentals of SQL language. Entity-relationship (ER) model. Database normalization. Advanced SQL queries. Introduction to database programming. Basics of PL/SQL. Advanced database programming techniques. Database security.

Learning Outcomes:
After successfully completing this course, students will be able to:
1. Design a database and use it in software development.
2. Create an Entity-Relationship (ER) diagram of a database.
3. Use SQL programming language to develop software applications.
4. Define access control mechanisms for databases.
5. Apply technical knowledge and skills to solve problems related to physical database modeling.

Required Literature:

1. Rober Manager: Baze podataka. Element, 2012.
2. Thomas Connolly, Carolyn E. Beg. Database Systems. Addison-Wesley, 2014.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Discrete Mathematics

Course Code:
ORS129

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
4	2 + 1 + 0	45	4

Course Objective:
To understand recursive structures and their application to recursive modeling; to adopt the basic principles of combinatorics and apply them to the analysis of algorithmic complexity; and to master fundamental concepts of graph theory and apply them to problems in computer science.

Course Content:
International System of Units (SI units). Structure of the atom. Forces between charges. Coulomb's law. Electric field of a point charge. Work in an electric field, electric potential, and voltage. Parallel plate capacitor and capacitance. Basic capacitor connections. Solving electrostatic networks. Electromotive force. Electric current. Electrical resistance. Dependence of resistance on temperature. Ohm's law. Series, parallel, and mixed connections of resistors. Energy and power in DC circuits, Joule's law. Methods for solving complex electrical networks. Measurement of basic electrical quantities in DC circuits. Range extension of measuring instruments.
Magnets and magnetic fields. Forces between magnetic poles. Magnetic induction and magnetic field strength. Materials in magnetic fields. Inductance. Magnetic circuits. Force on a current-carrying conductor in a magnetic field (Lorentz force) and Lenz's law. Faraday's law of electromagnetic induction, direction of induced voltage, and self-induction. Principles of operation of DC motors and DC generators.

Learning Outcomes:
After successfully completing this course, students will be able to:
1. Analyze fundamental phenomena and laws in electrostatic fields using physical principles and mathematical formalism.
2. Evaluate capacitance values for different capacitor configurations and solve complex electrostatic networks using appropriate methods.
3. Apply measurement methods to determine current, voltage, and power in DC circuits and analyze the obtained measurement results.
4. Analyze complex DC electrical networks using Ohm's law, Kirchhoff's laws, and appropriate network-solving methods.
5. Analyze basic phenomena and laws in magnetostatic fields and magnetic induction using relevant physical principles.
6. Analyze the principles of electromagnetic induction and the interaction of magnetic fields to explain the fundamental operating principles of electrical generators and motors.

Required Literature:

1. Kozlina, Ž., Osnove elektrotehnike, VVG, Velika Gorica, 2013.
2. Kuzmanović, B., Osnove elektrotehnike I, Element, Zagreb, 2018.
3. Kuzmanović, B., Osnove elektrotehnike I – Zbirka zadataka i pitanja, Element, Zagreb, 2018.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Electrical Engineering II

Course Code:
ORS1116

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
2	2 + 2 + 0	60	5

Course Objective:
To analyze dynamic phenomena in electrical networks and circuits with sinusoidal excitation.
To review and interpret concepts of energy and power in electrical power systems.
To introduce students to modern engineering software tools for electrical network analysis and simulation.

Course Content:
Linear and nonlinear systems and the application of Kirchhoff's laws. Node voltage method using linear algebra.
Dynamic systems and mathematical modeling.
Analysis of transient phenomena in RLC circuits.
Analysis of AC systems using phasors.
Power and three-phase electrical systems.
Work with SPICE simulators and the GNU Octave programming language.

Learning Outcomes:
After successfully completing this course, students will be able to:
1. Analyze transient phenomena in electrical circuits.
2. Analyze alternating current (AC) circuits.
3. Apply software tools for simulation of electrical systems.
4. Present the operating principles and characteristics of three-phase systems.
5. Measure basic electrical quantities in electrical circuits.

Required Literature:
1. Nilsson, J.W., Riedel, S.A. Electric Circuits, Pearson, 2019.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: English Language I

Course Code:
ORS106

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
1	1 + 1 + 0	30	2

Course Objective:
To acquire professional terminology and improve business communication skills in English through mastering relevant vocabulary and grammar. To develop language skills in a professional context — reading, listening, speaking, and writing — related to the field of computer systems.

Course Content:
Grammar: Word formation and verb tenses. Expressing and arguing opinions and attitudes, giving advice, numbers and numerical expressions, plural forms of nouns, comparison of adjectives. Professional topics: Generations of computers, types of computers, computer architecture, data storage and memory, computer security, notable figures in the field of IT.

Learning Outcomes:
After successfully completing this course, students will be able to:
1. Identify, analyze, and apply grammatical structures of the English language in real-life situations.
2. Appropriately use professional terminology and phrases from the IT field and apply them in new contexts.
3. Apply oral communication skills on IT-related topics and argue their opinions effectively.
4. Independently use professional and technical literature.
5. Produce written texts in English relevant to the professional field.

Required Literature:
1. Rubić, I. English for IT, Veleučilište Velika Gorica, Velika Gorica, 2014, 79 pages, ISBN: 978-953-7716-52-3, handbook.

Course title: English Language II

Course Code:
ORS112

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
2	1 + 1 + 0	30	2

Course Objective:
To acquire professional terminology and improve business communication in English through the acquisition of vocabulary and grammatical structures. To develop language skills in a professional context — reading, listening, speaking, and writing — related to the field of computer science.

Course Content:
Grammar and language: Countable and uncountable nouns, reported speech, articles, expressing the future, verb tenses, conditional sentences.
Professional topics: Software – alpha and beta testing, open source and closed source, operating systems, Green IT, cybercrime, robotics.

Learning Outcomes:
After successfully completing this course, students will be able to:
1. Identify, analyze, and apply grammatical structures of the English language in real-life situations.
2. Appropriately use professional terminology and phrases from the IT field and apply them in new contexts.
3. Apply oral communication skills on IT-related topics and argue their opinions effectively.
4. Independently use professional and technical literature.
5. Present critical reflections on the relationship between sustainable development and information technology, and propose possible solutions regarding environmentally friendly technologies and related issues.
6. Produce written texts in English relevant to the professional field.

Required Literature:
1. Rubić, I. English for IT, Veleučilište Velika Gorica, Velika Gorica, 2013, 79 pages, ISBN: 978-953-7716-52-3, handbook.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: English Language III

Course Code:
ORS117

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
3	1 + 1 + 0	30	2

Course Objective:
To acquire professional terminology and improve business communication in English through the acquisition of vocabulary and grammatical structures. To develop language skills in a professional context — reading, listening, speaking, and writing — related to the field of computer science.

Course Content:
Grammar and language: Collocations, compounds, prefixal word formation, phrasal verbs, describing trends, idioms and set phrases.
Professional topics: Nanotechnology, artificial intelligence and machine learning, electronic waste, VoIP, privacy in the digital age, cloud computing, green networking, cybercrime.

Learning Outcomes:
After successfully completing this course, students will be able to:
1. Identify, analyze, and apply grammatical structures of the English language in real-life situations.
2. Use professional terminology, collocations, and phrases from the IT field to describe business and technological trends.
3. Apply oral communication skills on IT-related topics and effectively argue opinions.
4. Independently use professional and technical literature.
5. Produce written texts in English relevant to the professional field.
6. Design and deliver (individually or in teams) oral presentations using audiovisual tools.

Required Literature:
1. Rubić, I. English for IT, Veleučilište Velika Gorica, Velika Gorica, 2013, 79 pages, ISBN: 978-953-7716-52-3, handbook.

VELEUČILIŠTE VELIKA GORICA
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Course title: Physics

Course Code:
ZAJ102

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
1	2 + 1 + 0	45	4

Course Objective:
To acquire and interpret fundamental laws of physics necessary for understanding and applying them in subsequent courses and in the professional field.

Course Content:
Historical introduction. The SI system of measurement units, scientific notation. Kinematics and dynamics of translational and rotational motion, Newton's laws. Work, power, and the law of conservation of mechanical energy. Periodic motion: oscillations, forced oscillations, and resonance. Waves — reflection, refraction, superposition, and standing waves. Sound waves. The electromagnetic spectrum. Visible light, color, interference, refraction at the boundary of optical media, total internal reflection, waveguides. Ionizing radiation. Density of materials, pressure. Statics and dynamics of fluids. Gas laws and thermodynamic processes, heat transfer. Electrical and thermal properties of materials, Joule heating. Structure of matter, quantum foundations of micro and nanophysics, new technologies.

Learning Outcomes:
After successfully completing this course, students will be able to:

1. Predict the motion of bodies under external forces, calculate corresponding dynamic quantities, and relate them to energy exchange with the surroundings.
2. Compare oscillations and resonance properties of single- and multi-degree-of-freedom systems, and describe types and characteristics of mechanical and electromagnetic wave propagation.
3. Evaluate pressure and forces acting on bodies immersed in fluids, and describe fundamental characteristics of fluid dynamics.
4. Interpret electrical and thermal properties of matter at both macroscopic and microscopic levels, and relate them conceptually to the physical principle of energy conservation.
5. Distinguish essential from non-essential data in problem-solving, model and solve simplified physical problems using mathematical and computational tools.
6. Critically assess the impact of simplifications and mathematical approximations on the results of simplified models and qualitatively generalize them to real-world and professional situations.

Required Literature:

1. Jelčić Dubček, D. Physics (e-course). Veleučilište Velika Gorica, 2018.
2. Jelčić Dubček, D. Physics – Exercise Book (e-edition). Veleučilište Velika Gorica, 2019.
3. Paić, M. Motion, Forces, Waves. Školska knjiga, Zagreb, 1997.

Paić, M. Heat and Thermodynamics. Školska knjiga, Zagreb, 1994.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Computer Structure and Application

Course Code:
ORS103

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
1	2 + 3 + 0	75	6

Course Objective:
To introduce students to the structure of computers and available software applications, and to develop practical computer usage skills.

Course Content:
Architecture of digital computers. Operating systems. Computer networks. Word processing using text processors. Working with spreadsheet applications. Creating presentations and image editing. Using database and information management software. Using messaging applications and the Internet. Tools for writing, editing, compiling, linking, and debugging application programs.

Learning Outcomes:
After successfully completing this course, students will be able to:

1. Identify, outline, and explain the architecture of a computer system.
2. Determine hardware and software characteristics of an available computer system.
3. Create and format text documents of varying length, content, and complexity.
4. Draw and insert various sketches and illustrations using software tools and integrate them into documents.
5. Apply formulas and functions to solve numerical problems in spreadsheet applications.
6. Select and graphically represent tabular data in spreadsheet applications.
7. Use computer network services, exchange messages, and access information.
8. Collect relevant information from various sources and organize it into an appropriate presentation.

Required Literature:

1. Srnec, T. et al.: ECDL 5.0 (Windows 7, Office 2010), PRO-MIL, 2011, ISBN: 978-953-7156-34-3
2. Gvozdanović, T.; Ikica, Z.; Kos, I.; Srnec, T.; Zvonarek, Lj.: E-citizen, PRO-MIL, 2005, ISBN: 953-7156-17-6

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Internet Infrastructure

Course Code:
ORS133

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
3	2 + 1 + 0	45	4

Course Objective:
To acquire fundamental knowledge about the Internet network and its services.

Course Content:
The Internet – the network of networks. Transmission Control Protocol/Internet Protocol (TCP/IP) model. Local Area Network (LAN) connections. Internet Service Providers (ISPs). Points of Presence (POP). Transport layer of the Internet model: TCP and UDP. Internet backbone. Routers. Addressing. Structure of IP addresses. Domains – Uniform Resource Locator (URL). Root Domain Name Server (DNS). NAT and DHCP. Web, mail, and FTP servers. BitTorrent protocol. Hypertext Transfer Protocol (HTTP). Other essential Internet services.

Learning Outcomes:
After successfully completing this course, students will be able to:
1. Formulate and explain basic Internet protocols.
2. Analyze protocol operations using traffic monitoring and analysis tools.
3. Configure simple web, mail, and FTP servers.
4. Manage (administer) web, mail, and FTP servers.
5. Test and critically evaluate the functionality of essential Internet services.
6. Design an IP network in accordance with the available address space.

Required Literature:

1. Kurose, J.F., Ross, K.W.: Computer Networking: A Top-Down Approach, Pearson, 2021.
2. Lebinac, M., Valenčić, M.: Computer Networks, VVG, 2013.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Communicology

Course Code:
ORS123

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
4	2 + 2 + 0	60	4

Course Objective:
To acquire knowledge of the communication process, types of communication, and principles of effective communication, as well as to develop and improve communication skills.

Course Content:
Introduction to communicology. Conceptual definition, basic characteristics of communication, and models of the communication process. Fundamental principles and common misconceptions about communication. Types of communication. Verbal and nonverbal communication. Sources of communication difficulties. Communication competence and communication skills. Communication skills: assertiveness and "I-messages." Communication skills: active listening. Communication skills: questioning techniques and conversation management. Communication skills: public speaking. Non-violent conflict resolution. Negotiation and mediation. Business communication. Debate.

Learning Outcomes:
After successfully completing this course, students will be able to:

1. Analyze, identify, and explain the elements and characteristics of the communication process.
2. Distinguish and compare different types of communication.
3. Discuss basic communication principles and common communication barriers.
4. Differentiate types of conflicts and styles of conflict resolution.
5. Critically evaluate and compare common negotiation techniques.
6. Describe and apply the rules of business communication.
7. Develop and apply acquired communication skills in everyday and professional contexts.

Required Literature:

1. Fox, R.: Business Communication, Hrvatska sveučilišna naklada – Pučko otvoreno učilište, Zagreb, 2006 (pp. 11–145).
2. Tomić, Z., Jugo, D.: Fundamentals of Interpersonal Communication, Synopsis, Sarajevo, 2021.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Mathematics I

Course Code:
ZAJ101

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
1	2 + 2 + 0	60	5

Course Objective:
To develop mathematical thinking and logical reasoning. To connect analytical results with the graphical interpretation of functions. To understand fundamental statistical concepts and methods of computation.

Course Content:
MATHEMATICAL LANGUAGE. Arithmetic expressions. Algebraic expressions. Equations. Qualitative, analytical, and numerical methods of solving equations. Applications of equations. Applications in the analysis of geometric bodies and shapes. Applications in physics.
FUNCTIONS. Definition of a function – functional rule, graph, domain, and range. Continuity. Sign of a function. Growth, decrease, and extrema. Inflection points. Limits and asymptotic behavior.
ELEMENTARY FUNCTIONS. Linear functions. Quadratic functions. Polynomials and rational functions. Roots and powers. Exponential and logarithmic functions. Trigonometric and inverse trigonometric functions. Applications in geometry and physics.
BASIC STATISTICAL CONCEPTS. Population, random sample, and random events.
PROBABILITY MODELS. Random events and probability.
VARIABLES. Concept and classification. Discrete variables. Binomial and Poisson distributions. Continuous variables. Normal and exponential distributions.
RELATIONSHIP BETWEEN VARIABLES. Linear models, correlation, and regression.
RANDOM SAMPLE. Point estimates. Plug-in model.
INFERENTIAL STATISTICS. Confidence intervals. Hypothesis testing.

Learning Outcomes:
After successfully completing this course, students will be able to:
1. Select and critically evaluate systems of equations in mathematical modeling of problems.
2. Select and critically evaluate functions in mathematical modeling of problems.
3. Select and critically evaluate derivatives or integrals in mathematical modeling of problems.
4. Select and critically evaluate vector expressions in mathematical modeling of problems.
5. Select and critically evaluate matrix expressions in mathematical modeling of problems.

Required Literature:
1. Čulina, B., Zlopaša, Š.: Mathematics for Technical Colleges, Parts I–III, University of Applied Sciences Velika Gorica, Velika Gorica, 2010.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Mathematics II

Course Code:
ZAJ108

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
2	2 + 2 + 0	60	4

Course Objective:
To apply the fundamentals of differential and integral calculus in solving problems in geometry and physics. To apply the basics of vector and matrix calculus in geometry, physics, and solving systems of equations. To relate first-order differential equations to physical applications. To relate second-order linear differential equations to linear systems. To connect the fundamentals of differential and integral calculus of scalar functions of several variables and vector functions of one or more variables with applications in geometry and physics.

Course Content:
DERIVATION. Concept of derivative and partial derivative. Rules of differentiation. Mechanical applications of derivatives. Optimization problems.
INTEGRAL. Concept of the indefinite integral and basic rules of computation. Integration techniques: substitution and integration by parts. Mechanical applications of indefinite integrals. Concept of the definite integral and its computation. Applications of definite integrals to calculating areas.
DIFFERENTIAL EQUATIONS. Basic concepts. Separation of variables method. Second-order linear differential equations: constant coefficients and simple non-homogeneous terms.
VECTORS. Definition of vectors. Vector operations, geometric meaning, and computation.
MATRICES. Systems of linear equations. Matrix algebra. Matrix geometry.
VECTOR FUNCTIONS OF ONE VARIABLE. Differentiation and integration. Applications to motion and curves.
SCALAR FUNCTIONS OF SEVERAL VARIABLES. Partial derivatives. Tangent plane and differential. Directional derivatives and gradient. Applications to optimization problems. Double and triple integrals. Applications to calculating areas and volumes. Applications in physics.
INTEGRATION OVER CURVES AND SURFACES of scalar and vector fields. Conservative fields. Applications in geometry and physics.

Learning Outcomes:
After successfully completing this course, students will be able to:
1. Select and critically evaluate limits or derivatives in mathematical modeling of problems.
2. Select and critically evaluate indefinite and definite integrals or differential equations in mathematical modeling of problems.
3. Apply differential calculus of multivariable functions to determine tangent planes and analyze motion of a point along a spatial curve.
4. Solve integrals of scalar and vector fields along a given curve or surface, independently or using computer tools.

Required Literature:

1. Čulina, B., Zlopaša, Š.: Mathematics for Technical Colleges, Part III, University of Applied Sciences Velika Gorica, Velika Gorica, 2010.
2. Čulina, B., Golubić, I.: Mathematics for Technical Colleges, Part IV, University of Applied Sciences Velika Gorica, Velika Gorica, 2015.
3. Čulina, B., Zlopaša, Š.: Mathematics for Technical Colleges, Part V, University of Applied Sciences Velika Gorica, Velika Gorica, 2015.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Mathematics III

Course Code:
ORS113

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
3	2 + 1 + 0	45	4

Course Objective:
To understand and acquire fundamental numerical and statistical methods required in engineering practice.

Course Content:
NUMERICAL MATHEMATICS. BASIC CONCEPTS. Approximate computation and computational errors.
FUNCTION CALCULATION. Horner's algorithm. Taylor series expansion. Calculations using power series.
NUMERICAL SOLUTION OF EQUATIONS. Bisection method and fixed-point iteration method.
NUMERICAL DIFFERENTIATION AND INTEGRATION. Simpson's method.
NUMERICAL SOLUTION OF DIFFERENTIAL EQUATIONS. Euler's method.
STATISTICS. INTRODUCTION. Population, random sample, and random event.
PROBABILITY MODELS. Random events and probability.
VARIABLES. Discrete population variables, random events, and random samples. Binomial variable. Continuous population variables, random events, and random samples. Normal variable.
RELATIONSHIP BETWEEN VARIABLES. Concept of correlation between random variables. Linear model.
INFERENTIAL STATISTICS. Determining the theoretical model. Point and interval estimation. Hypothesis testing and decision making.

Learning Outcomes:
After successfully completing this course, students will be able to:
1. Numerically compute function values using infinite polynomials and iterative methods, and analyze errors.
2. Numerically solve differential equations and analyze computational errors.
3. Calculate probabilities for binomial and normal random variables.
4. Create histograms and compute statistical measures for discrete and continuous data sets.

Required Literature:

1. Čulina, B., Čulina, D.: Elementary Numerical Mathematics Using Excel, University of Applied Sciences Velika Gorica, 2010.
2. Čulina, B., Čulina, D.: Elementary Probability and Statistics Using Excel, University of Applied Sciences Velika Gorica, 2010.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Management and Entrepreneurship

Course Code:
ZAJ125

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
0	2 + 2 + 0	60	4

Course Objective:
To acquire knowledge and develop entrepreneurial and managerial skills that enable students to initiate, manage, and implement their own projects in the field of computer systems maintenance, applying principles of economic efficiency, professional responsibility, and social sustainability—whether as employees, specialists, or entrepreneurs in the IT sector.

Course Content:
Introduction to management. Fundamental management functions. Control: use of performance indicators (individual indices, rate of change). SWOT/TOWS analysis in the IT context. Leadership and motivation in IT teams. Human resource management in IT. Corporate social responsibility. Marketing strategies (generic strategies) and competitive advantage in IT. Development and presentation of an entrepreneurial project. Presentation skills and pitch formats. Project evaluation according to criteria of innovation, applicability, and sustainability.

Learning Outcomes:
After successfully completing this course, students will be able to:

1. Analyze and apply fundamental management functions (planning, organizing, leading, and controlling) in the context of technical and IT processes.
2. Develop SWOT and TOWS analyses and formulate basic strategic goals for IT-related projects.
3. Apply human resource management principles in teamwork and daily IT operations.
4. Propose competitive marketing strategies (e.g., generic strategies) for positioning IT services or products on the market.
5. Create an entrepreneurial project in the field of computer systems maintenance following current startup competition guidelines.
6. Present an entrepreneurial project in the field of computer systems maintenance according to startup competition standards.

Required Literature:

1. Belak, V.: Management in Theory and Practice, Zagreb, Belak Excellens d.o.o., 2015.
2. Golob, B.: Innovation from Idea to Market, Rijeka, Dragon d.o.o., 2009. (Free e-book, contact: een@bicro.hr)

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Computer Maintenance

Course Code:
ORS126

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
5	2 + 2 + 0	60	4

Course Objective:
To acquire general knowledge about types and causes of malfunctions in electronic components and devices, the adverse effects of the environment on proper device operation, and the importance of preventive maintenance. To gain specialized knowledge necessary for successful diagnostics and maintenance of PC computers.

Course Content:
Basic concepts and the need for maintenance. Effectiveness and efficiency of electronic devices. Definitions of reliability and the relationship between quality and reliability of devices. Causes and types of failures in electronic components: gradual and sudden failures. Typical malfunctions of analog and digital components and devices. Concepts and states of (mal)functionality of devices. Modeling reliability of electronic components, software for reliability calculation and management, and protective measures (overload, overvoltage, etc.). Reliability and availability of devices (intrinsic, achievable, operational). Maintainability, quantitative and qualitative indicators. Models of preventive, corrective, and condition-based maintenance. Diagnostics and preventive maintenance tasks (cleaning, cooling, degradation monitoring, verification, inspections, etc.). Methods and techniques of defect detection, and technological procedures for device repair. Determining the range of spare parts for preventive and corrective maintenance, and consumables. Models and programs for calculating spare parts quantities. Issues of component compatibility in computer maintenance. Built-in software support for computer diagnostics. Basic structure of a maintenance system and the relationship between maintenance concepts, technology, and organization. Interaction and cooperation between users and maintenance personnel. Modern trends in computer maintenance.

Learning Outcomes:
After successfully completing this course, students will be able to:

1. Recognize reliability, maintainability, and availability parameters, and explain their connection to the maintenance of technical equipment.
2. Calculate performance indicators and, based on them, outline preventive, corrective, or predictive (proactive) maintenance systems.
3. Critically evaluate the advantages and disadvantages of different maintenance models.
4. Apply appropriate methods for computer diagnostics and defect detection during maintenance.
5. Calculate required quantities of spare parts for computer maintenance.
6. Distinguish between maintenance concept, technology, and organization, and integrate them into a maintenance system considering user requirements and technical equipment properties.

Required Literature:

1. Barković, M.: Logistical Support for Electronic Systems (supplemented web edition), Zagreb, 2006. (Selected chapters available on Veleučilište Velika Gorica intranet)
2. Barković, M.: Collection of Solved Problems (Reliability and Availability of Electronic Devices), Zagreb, 2015

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Maintenance of Computer Systems and Networks

Course Code:
ORS1222

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
4	2 + 2 + 0	60	4

Course Objective:
To acquire fundamental knowledge in IT system administration.

Course Content:
Installation, configuration, and deployment of Windows Server operating system. TCP/IP networking, DNS and DHCP network services. Implementation and administration of Microsoft Active Directory infrastructure. Administration of Microsoft Group Policy tools. File systems and data storage. Microsoft remote access services (RD and RDS). Tools for monitoring the Windows Server operating system.

Learning Outcomes:
After successfully completing this course, students will be able to:

1. Perform installation and configuration of server operating systems while applying security guidelines and best practices.
2. Explain the functionality of network services and configure them according to organizational requirements.
3. Implement and configure domain services, manage users and groups, and configure replication and Group Policy.
4. Plan, implement, and maintain data storage systems.
5. Plan, configure, and administer remote access services via Remote Desktop Protocol and Remote Desktop Services.
6. Critically evaluate and interpret server performance using monitoring tools.

Required Literature:

1. Windows Server 2019 Administration Fundamentals, 2nd Edition

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Operating Systems I

Course Code:
ORS110

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
2	2 + 2 + 0	60	5

Course Objective:
To master the theoretical foundations and basic functioning of operating systems and acquire practical knowledge and skills for managing MS Windows operating systems.

Course Content:
Tasks of an operating system. Multitasking and multiuser environments. Basic structure and architecture. Fundamental principles of operating systems. Processes. Threads. Process scheduling. Process synchronization. Process blocking. Memory management. File systems.

Learning Outcomes:
After successfully completing this course, students will be able to:

1. Analyze the functioning of modern operating systems.
2. Present the functions of processes and threads.
3. Manage Windows desktop operating systems.
4. Evaluate states and trends of modern operating systems and assess their applicability.
5. Critically assess the importance and interrelation of computer systems, software, and operating system functions.

Required Literature:

1. Leo Budin et al.: Operating Systems, University of Zagreb Textbooks, ELEMENT 2010, ISBN: 978-953-197-610-7
2. Software manufacturer materials

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Operating Systems II

Course Code:
ORS115

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
3	2 + 2 + 0	60	6

Course Objective:
To acquire knowledge of multiuser and multitasking operating systems.

Course Content:
Introduction. Installing the OS on physical and virtual machines. Overview of Linux. Basic tools. Preparation (tips and tricks) for the practical assignment. File System I. File System II. Users and permissions. Processes. Process management. Shell. Introduction to system administration.

Learning Outcomes:
After successfully completing this course, students will be able to:

1. Apply basic UNIX commands and concepts for efficient system use via the command line (CLI).
2. Manage user accounts and groups on a UNIX system and apply basic security mechanisms to protect user data and resources.
3. Analyze the structure of the UNIX file system and apply standard and advanced permissions for secure management of file and directory access.
4. Customize shell settings and use standard filtering tools (e.g., grep, sed, awk) to automate tasks and process text via shell scripts.

Required Literature:

1. Sarwar, Koretsky – UNIX: The Textbook, CRC Press, 2016
2. Nemeth – UNIX and Linux System Administration, Addison-Wesley Professional, 2017

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Quality Assurance and Control

Course Code:
ZAJ118

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
3	2 + 0 + 0	30	3

Course Objective:
Acquire knowledge about quality, methods, techniques, procedures, and tools within quality control and assurance systems.

Course Content:
Quality system: definition of quality and quality system, aspects of quality, historical development, quality control, quality assurance, quality management, and supervision. Principles, methods, techniques, and tools for establishing a quality system; process approach. Integrated management systems. Fundamental requirements, directives/guidelines, compliance with fundamental requirements, conformity assessment system; authorization, verification (accreditation, certification). Standardization. Education in quality and management of knowledge, time, and changes.

Learning Outcomes:
After completing this course, students will be able to:
1. Select and apply methods for managing a quality management system.
2. Demonstrate methods, techniques, and tools for quality management and identify necessary quality control procedures.
3. Verify, review, and identify control points in a management system to detect nonconformities and opportunities for continuous improvement.
4. Plan and organize the implementation of a quality management and assurance system.
5. Gather necessary national and international information and apply it to quality management and control procedures within an organization.

Required Literature:
1. Kacian Ivetić, I.: Osiguravanje i kontrola kvalitete, Iproz d.o.o., Zagreb, 2018

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Fundamentals of Ecology

Course Code:
ZAJ131

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
1	2 + 0 + 0	30	3

Course Objective:
Acquire knowledge about human-induced disturbances in nature and the measures necessary to restore ecological balance.

Course Content:
Definitions, boundaries, and subdivisions of ecology; ecology of an individual; population and its parameters; population growth; geographic and ecological space; ecological niche and ecological valence; habitat, biological community, and ecosystems; origin, structure, exchange, and stability of biological communities; biodiversity; protected areas; cycles and material flows in ecosystems; ecological division of space; vegetation; industry and society; industrial development trends and environmental impact; natural resources and social science perspectives; life cycle of industrial products (raw material origin, processing, useful life, disposal); maintaining balance between industrial development and natural ecosystems; industrial society and climate change; water, soil, and air as ecological factors; global environmental changes; anthropogenic environmental impacts; ecological accidents; global environmental issues; radiation effects on the environment; sustainable development; transport and the environment.

Learning Outcomes:
After completing this course, students will be able to:

1. Explain fundamental ecological concepts and classifications and interpret environmental protection laws and regulations.
2. Apply basic ecological principles to analyze ecological processes and ecosystem dynamics.
3. Correlate causes and consequences of environmental pollution.
4. Analyze the impact of transport, emissions, and radiation on the environment and human health and propose measures to reduce harmful effects.
5. Assess environmental pollution risks and apply sustainable development principles in waste management, including proper waste classification and effective disposal methods in accordance with sustainability principles.
6. Evaluate the application of green technologies, renewable energy sources, and strategies to reduce environmental pollution risks.

Required Literature:

1. Kalambura, S., Jovičić, N.: Ecology, Velika Gorica, 2018

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Programming

Course Code:
ORS105

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
1	2 + 3 + 0	75	6

Course Objective:
To understand, acquire, and apply the fundamental principles of programming and to develop the ability to approach program development problems systematically using structured programming concepts.

Course Content:
Introduction to computer data processing. Programming languages. Algorithms. Basic program structure. Data types. Variable assignment. Expressions. Output of values. Input of values. IF statement. For loop. While loop. Lists. Subprograms. Files. Functions. Modules. Error handling.

Learning Outcomes:
After completing this course, students will be able to:

1. Describe the structure and syntax of a programming language
2. Analyze the execution of programs
3. Write simple and complex programs using basic data types and structures
4. Apply principles of structured and modular programming to solve practical problems in their field
5. Use and adapt programming modules from other authors in writing their own programs
6. Critically follow the development of programming languages

Required Literature:

1. Swaroop, A Byte of Python, 2013
2. Online Python v3.x.x documentation

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Database Programming

Course Code:
ORS136

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
4	2 + 2 + 0	60	4

Course Objective:
Students should acquire knowledge of database programming on various platforms.

Course Content:
Relational data model. Object-oriented data models. SQL Server. Controls for data manipulation. Parameterized queries. Working with triggers. Locking levels and mechanisms. Deadlocks. Application-level locking. Creating web forms for database communication.

Learning Outcomes:
After completing this course, students will be able to:

1. Explain the relational and object-oriented data models
2. Explain database normalization
3. Use SQL query language on a database
4. Create forms for data entry into a database
5. Develop web forms to interact with a database
6. Recognize the need for lifelong learning and adopt new technologies
7. Coordinate activities when working in a multidisciplinary team

Required Literature:

1. Steven Feuerstein, Bill Pribyl: Oracle PL/SQL Programming, 6th Edition, O'Reilly, 2014

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: C Programming Language

Course Code:
ORS139

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
2	2 + 2 + 0	60	4

Course Objective:
Acquire knowledge of programming in the C language.

Course Content:
Introduction to programming tools and writing the first C program. Data types. Constants, variables, expressions, operators, mathematical and logical operations. Control statements and program flow constructs. Loops. One-dimensional arrays and functions. Two-dimensional arrays. Strings. Pointers and the program memory model.

Learning Outcomes:
After completing this course, students will be able to:

1. Apply C syntax rules and structured programming principles to develop solutions for given problems.
2. Analyze C code to identify and fix logical and syntax errors using standard debugging techniques.
3. Develop algorithmic solutions for abstract or practical problems and implement them using fundamental C constructs.
4. Structure data using basic and complex data types for efficient problem-solving.
5. Connect C pointers with data types and the program memory model.
6. Apply C pointers in the implementation of algorithmic solutions.

Required Literature:

1. K. N. King: C Programming, A Modern Approach, Second Edition, W. W. Norton & Company, 2008.

Course title: Information Systems Design

Course Code:
ORS124

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
6	2 + 2 + 0	60	4

Course Objective:
Acquire knowledge of logical design of information systems (IS). Equip students for independent and team work in applying methodologies, methods, and techniques for designing information systems for business organizational systems. Students will understand that the realization of a real and complex information system is impossible without a detailed analysis and documented IS project, which forms the basis for physical implementation.

Course Content:
Definitions and structure of information systems – descriptive and genetic definitions. Role of IS in organizational (business) systems. IS life cycle, development phases, and content. Methods for IS design, models, and modeling – importance in IS development. Modeling real system processes using Structured System Analysis (SSA). Process modeling using Data Flow Diagrams (DFD) and rules for DFD creation. Description of data flows and data stores from DFD (Data Dictionary). Data modeling concepts. Conceptual data modeling (ER – Entity Relationship model). Rules and relationships in ER data modeling. Basics of logical design of relational data models. Object-oriented data modeling. Translating conceptual (ER) model into relational model. Vertical and horizontal normalization, normal forms and rules. Creating IS project documentation.

Learning Outcomes:
After completing this course, students will be able to:
1. Analyze business processes in real systems using Data Flow Diagrams (DFD).
2. Critically evaluate data flows and data stores.
3. Create a conceptual (ER) data model using DFD descriptions of data flows and stores.
4. Translate a conceptual (ER) model into a relational data model.
5. Perform data normalization in the relational model through 1st, 2nd, and 3rd normal forms.
6. Develop algorithms to retrieve information from the relational data model using flowchart methods.

Required Literature:
1. Pavlić, M.: Informacijski sustavi, Školska knjiga, 2011.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Psychology of Stress

Course Code:
ZAJ132

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
1	2 + 1 + 0	45	3

Course Objective:
Introduce students to the circumstances of stress occurrence, its effects on perception, behavior, and human health, and possible approaches for prevention, mitigation, and elimination of stress.

Course Content:
Introduction: historical development of stress concepts. Basic terms: stressor, stress, stress response. Types and forms of stressors, stress, and stress responses. Biological basis of stress response: role of the nervous and endocrine systems. Stress and immune system functioning: relationship between stress and illness; stress-related somatic diseases. Theoretical approaches to stress: psychodynamic theory, fight-or-flight theory, general adaptation syndrome, significant life changes theory, transactional stress model, diathesis-stress model Stress mediators and moderators: situational characteristics (intensity, frequency, controllability, developmental aspects) and individual characteristics (demographics, personality traits). Coping with stress. Specific stress sources and their consequences: occupational stress, burnout, mobbing, traumatic stress, PTSD. Communication as a source of stress and stress prevention through effective communication. Tech-stress: negative effects of technology use. Stress management and prevention: organizational climate, treatment options, lifestyle habits, physical.

Learning Outcomes:
After completing this course, students will be able to:
1. Explain key stress-related concepts, including stressors, stress, and stress responses, as well as their relationships and classification
2. Explain how different stress causes affect health, perception, and behavior
3. Evaluate various theoretical approaches to stress, including psychophysiological, social, cognitive, and integrative models
4. Analyze coping strategies and distinguish adaptive and maladaptive forms for maintaining physical and mental health
5. Propose activities to reduce or prevent stress, emphasizing interventions in organizational and work environments typical for engineering professions

Required Literature:
1. Havelka Meštrović, A. & Havelka, M. (2020). Health Psychology: Psychosocial Foundations of Health, Jastrebarsko: Naklada Slap – chapters related to stress

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Computers and Processes

Course Code:
ORS116

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
3	2 + 2 + 0	60	5

Course Objective:
Acquire knowledge and skills related to production processes supported by computer systems.

Course Content:
Signals, systems, and process control: types of signals and systems, instantaneous and dynamic systems. Basic process unit: data processing, equipment of the process unit, standard process inputs and outputs. Actuating and measuring devices. Task division in plant control: overview of computer equipment, communication, and process protocols, channel capacity. Role of software in process control: data processing, software for data processing, relative relationship between hardware and software components. Information system development process: characteristics, database design, process modeling, system design, construction, and maintenance. User programs: tasks of user programs, structure, real-time data processing, information transfer, and communication.

Learning Outcomes:
After completing this course, students will be able to:
1. Analyze systems and process control
2. Present basic process units
3. Critically evaluate core components of an information system
4. Compare business process models using graphical presentations
5. Propose the design of an information system

Required Literature:
1. Perić, Petrović, Vašak: Process Automation, FER, 2013
2. Perić: Basics of Process Automation, FER, 1993

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Computer Networks

Course Code:
ORS120

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
4	2 + 2 + 0	60	5

Course Objective:
Acquire fundamental knowledge about the purpose, technology, and functioning of computer networks.

Course Content:
Basic communication protocols and network topologies. Local Area Networks (LANs). Physical layer. Data link layer (HDLC, Ethernet, PPP). Network performance requirements with respect to distance and bandwidth. Internet fundamentals. Frame Relay, ATM, and MPLS. Remote access to computer networks.

Learning Outcomes:
After completing this course, students will be able to:

1. Define the general architecture of LAN and WAN networks
2. Formulate basic protocols in computer networks
3. Design simple computer networks for small and medium-sized enterprises
4. Analyze the operation of protocols at the internet layer
5. Manage network equipment (switches, routers)
6. Classify different types of computer networks
7. Critically evaluate network functionality of personal computers and connect them to a network

Required Literature:

1. Lebinac, Valenčić: Computer Networks, textbook, VVG, 2013

Course title: Computer Process Control

Course Code:
ORS121

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
4	2 + 2 + 0	60	5

Course Objective:
Acquire knowledge and skills in designing computer-supported production processes.

Course Content:
Process handling and control: process states, operator–process interaction, and automatic actions. Role of the operator in process control systems: monitoring operator activity, operator response, intelligent control procedures. Implementation of control systems, feasibility study (data quantities, data flows, process control specifications, conceptual system design). Cost–benefit analysis, operating costs. Designing a computer-based control system: communication design and control centers. System implementation: software development (module, subsystem, and system level), testing, and deployment. Human factors in system development, project team roles. System testing, handover, and maintenance. Staff training.

Learning Outcomes:
After completing this course, students will be able to:

1. Analyze process states and operator–process interactions
2. Determine the role of the operator in process control systems
3. Develop solutions for project control systems
4. Plan project management systems
5. Evaluate, justify, and create a project cost diagram
6. Form a project team
7. Present project documentation

Required Literature:

1. B. Ruecker, Practical Process Automation, O'Reilly Media, 2021

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Satellite Geographic Positioning

Course Code:
ORS511

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
5	2 + 1 + 0	45	4

Course Objective:
Analyze the fundamental principles of satellite communication and global satellite positioning, including precise time determination, and their role in the context of information and communication technologies (ICT).

Course Content:
Historical development, operational principles, and main segments of Global Navigation Satellite Systems (GNSS). Satellite orbits, constellations, and orbital characteristics. Satellite components: atomic clocks, solar panels. Satellite communication: electromagnetic waves, signal modulation and coding. Determination of global geographic coordinates using trilateration. Timing errors and influences: atmosphere, ionosphere, anthropogenic structures, interference, and multipath effects. Improving GNSS accuracy and integrity: differential systems and geostationary augmentation systems. GNSS security and resilience. Integration of satellite positioning with IT systems, applications in personalization, optimization of mobile and web applications, and sustainable development.

Learning Outcomes:
After completing this course, students will be able to:
1. Physically explain satellite orbits and differences in orbital periods
2. Interpret radio-wave communication and satellite signal coding
3. Explain the mathematical principle of determining global geographic coordinates using trilateration
4. Present the functioning of satellites and differences/interoperability of current GNSS
5. Present the impact of atmospheric and space disturbances, and anthropogenic structures on satellite communication, and methods to improve GNSS accuracy (differential systems, EGNOS)
6. Analyze the application of satellite navigation in the context of sustainable societal development (automated transport, precise time determination, emergency services, precision agriculture)

Required Literature:
J.S. Subirana, J.M. J. Zornoza, M. Hernández-Pajares. GNSS Data Processing, 2013
Vol. I: Fundamentals and Algorithms
Vol. II: Laboratory Exercises
ISBN 978-92-9221-886-7 (ESA TM-23/1, May 2013) – freely available online

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Information Systems Security

Course Code:
ORS127

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
6	2 + 2 + 0	60	3

Course Objective:
Acquire knowledge about the protection of information systems.

Course Content:
Introduction to information systems security. Threats, vulnerabilities, and attacks. Security controls. Security policies. Network device security. Authentication, authorization, and accounting (AAA). Access control and Access Control Lists (ACLs). Complex ACLs. Firewalls and firewall security policies. Intrusion Detection and Prevention Systems (IDS/IPS). Cryptographic protection. Virtual Private Networks (VPNs).

Learning Outcomes:
After completing this course, students will be able to:
1. Analyze an information system and detect its weak points and vulnerabilities
2. Create a risk analysis and identify critical areas of the system
3. Recommend standard system protection functions
4. Recommend basic protective mechanisms and technologies for network equipment in an information system
5. Analyze the IP Security protocol and compare modern cryptographic methods

Required Literature:
1. Jordan Genung, Steven Bennett – CC Certified in Cybersecurity All-in-One Exam Guide, McGraw Hill, 2023
2. Cisco Networking Academy websites: www.netacad.com

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Symbolic Logic

Course Code:
ORS107

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
2	2 + 2 + 0	60	5

Course Objective:
Acquire the logical language and its use in clarifying ideas and reasoning. Learn the basic concepts of set theory (set, relation, function, structure) and its use in problem modeling. Learn the basic concepts of computability theory and its use in algorithmic problem solving.

Course Content:
Mathematical language: Analysis and comparison with natural language. Propositional logic: Syntax, semantics, logical concepts, truth tables, refutation trees, translation and analysis, application in logic circuits. Predicate logic: Syntax, semantics, logical concepts, refutation trees, translation and analysis, limits of logic, applications in logic programming and verification of software and hardware correctness. Set theory: Concepts of sets, relations, functions, and mathematical structures; applications in databases, functional programming, data structures, and symmetric key cryptography. Computability: Concepts of computability and computational complexity; applications in asymmetric key cryptography.

Learning Outcomes:
After completing this course, students will be able to:
1. Verify the truth of statements in propositional logic using refutation trees.
2. Verify the truth of statements in predicate logic.
3. Classify relations and functions according to their properties.
4. Apply finite algebraic structures in cryptography.

Required Literature:
1. B. Čulina, N. Majstorović: Introduction to Mathematical Logic and Fundamentals of Mathematics, Veleučilište Velika Gorica, 2012.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Practical Training

Course Code:
SP-ORS

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
0	0 + 15 + 0	225	15

Course Objective:
Acquire practical experience in maintaining computer systems.

Course Content:
Familiarization with the company and work environment. Introduction to IT-related tasks in a partner company or institution. Observing the work of mentors and other employees in ICT tasks. Performing ICT tasks independently under the supervision of a mentor.

Learning Outcomes:
After completing this course, students will be able to:

1. Describe business processes involved in computer system maintenance.
2. Identify problems in the ICT domain and propose solutions.
3. Use tools and equipment for maintaining and developing computer systems.
4. Verify the operational status of computer systems.
5. Recommend optimal computer system configurations for specific users and tasks.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Office Applications

Course Code:
ORS119

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
4	2 + 1 + 0	45	4

Course Objective:
Acquire basic knowledge of office applications and understand their specific features through practical examples, focusing on MS Office, particularly MS Access and MS Excel.

Course Content:
Basics of office operations. Types of office applications. Office operations in the private and public sectors. Business communication. Processing business documents. Development of office (administrative) information systems. Computer hardware for office applications. Integrated business applications for office operations – word processors, spreadsheets, and presentation software. MS Office: detailed coverage of MS Access, plus MS Word, MS Excel, MS PowerPoint. Interaction between different MS Office tools. Local (LAN) networks for office operations. Analysis of office functions regarding workflows and data content. Analysis and preparation of necessary data for an office application. Design of conceptual and relational data models for office applications. Creation of practical applications using MS Access. Data updating and reporting from the created application.

Learning Outcomes:
After completing this course, students will be able to:
1. Analyze data requirements for an office application.
2. Design a conceptual data model for an office application.
3. Translate the conceptual model into a relational data model.
4. Create a database in MS Access and test it with sample data.
5. Develop queries to retrieve specific information from the database for the office application.

Required Literature:

1. Sabati, Z.: Automatizacija uredskog poslovanja, skripta.
2. Anne Poatsy et al.: Exploring Microsoft Office 2016 Volume 1 / Edition 1, ISBN-10: 0134320794

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Computer System Devices

Course Code:
ORS130

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
0	2 + 1 + 0	45	4

Course Objective:
Learn the principles of operation, installation, and use of individual computer system devices.

Course Content:
Historical development of digital computers and computer systems. Structural organization of computers. Classification of computer devices by purpose. Number systems and data representation in computers. Introduction to digital logic and Boolean algebra. Basic components and operation of digital computers. Processors (CPU organization, operation, instruction execution, RISC, CISC). Internal buses (structure, operation, PCI). Characteristics and hierarchy of data storage (memory). Cache memory structure and operation. Internal memory (ROM, SRAM, DRAM): organization, operation, and types. External memory: magnetic disks (types, operation, data organization, performance, RAID), optical disks (CD, DVD), magnetic tapes. Operation and access of peripheral devices (monitors, keyboards, mice, printers, network devices, digital cameras, etc.). Computer input/output systems. I/O operations (programmed, interrupt-driven, DMA). External interfaces (serial, parallel, RS232C, USB, FireWire, Infiniband). Operating systems. Mobility and connectivity of computer systems. Performance of digital computers. High availability of computer systems (redundancy, UPS).

Learning Outcomes:
After completing this course, students will be able to:

1. Analyze the main components of modern computer systems (processor, memory, buses) and their interaction in program execution.
2. Apply principles of Boolean algebra and various number systems to analyze data representation and processing in computers.
3. Analyze basic digital circuits.
4. Analyze processor and memory architectures and evaluate key factors affecting computer system performance.
5. Assess the suitability of different types of computer systems (from embedded to server systems) for specific technical and business applications.

Required Literature:

1. Jim Ledin - Modern Computer Architecture and Organization, Packt Publishing, 2022
2. Douglas E. Comer - Essentials of Computer Architecture, Prentice Hall, 2005

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Introduction to Machine Learning

Course Code:
ORS411

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
4	2 + 1 + 0	45	4

Course Objective:
Through this course, students will acquire the fundamental principles of machine learning and learn to systematically apply them to data processing and decision-making problems using machine learning systems.

Course Content:
Introduction to machine learning. Supervised and unsupervised learning. Algorithms for classification, regression, and clustering. Dimensionality reduction. Data preprocessing. Text data handling. Artificial neural networks. Model evaluation and selection. Visualization of results.

Learning Outcomes:
After completing this course, students will be able to:

1. Select appropriate machine learning methods for specific business problems and define the input data sets for the model.
2. Apply various machine learning methods suitable for selected classification or regression business problems.
3. Apply different machine learning techniques such as neural networks, support vector machines, decision trees, Bayesian networks, genetic algorithms, and others in the context of business information systems.
4. Evaluate and optimize a machine learning model in the context of a defined business problem.

Required Literature:

1. Mehryar, M., Rostamizadeh, A., & Talwalkar, A. (2018). Foundations of Machine Learning. The MIT Press.
2. Stipaničev, D., Šerić, L., & Braović, M. (2021). Uvod u umjetnu inteligenciju. 1st edn. Edited by V. Papić. Split: Faculty of Electrical Engineering, Mechanical Engineering, and Naval Architecture, Split.

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Web Applications

Course Code:
ORS135

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
5	2 + 1 + 0	45	4

Course Objective:
To equip students with the skills to independently install, configure, and maintain web servers, understand the architecture and organization of websites, review FTP and World Wide Web services, and solve typical web-related problems.

Course Content:
Internet infrastructure. Web server setup and configuration. Web controls for data presentation. HTML server controls. Data validation. Managing state in PHP applications. Web service security. Web services: usage and development. Creating and maintaining web services.

Learning Outcomes:
After completing this course, students will be able to:
1. Build a web application
2. Apply methods for retrieving and modifying data in a web application
3. Critically evaluate and demonstrate ways to improve a web application
4. Describe the XML language and its application
5. Recognize the need for lifelong learning by adopting new technologies
6. Coordinate activities in a multidisciplinary team

Required Literature:

1. Šimec, Alen; Introduction to HTML, XHTML, and CSS; Technical College of Zagreb; 2011
2. Šimec, Alen; Programming and Optimization of Web Pages in HTML5 Environment; Technical College of Zagreb; 2015
3. Nixon, Robin; Learning PHP, MySQL, JavaScript, CSS & HTML5, 3rd Edition; O'Reilly Media; 2014
4. Purewal, S.; Learning Web App Development; O'Reilly Media; 2014
5. Fielding, J.; Beginning Responsive Web Design with HTML5 and CSS3; Apress, 2014

VELEUČILIŠTE VELIKA GORICA
UNIVERSITY of APPLIED SCIENCES VELIKA GORICA

Course title: Final Thesis

Course Code:
ZR-ORS

Semester:	Lectures + Exercises + Seminar:	Total Hours:	ECTS Credits:
6	0 + 5 + 0	75	23

Course Objective:
To demonstrate that the student is capable of independently defining and addressing a professional topic and applying the knowledge acquired during their studies.

Course Content:
Lectures on the methodology and structure of the final thesis. Independent work on the thesis under the supervision of a mentor.

Learning Outcomes:
After completing this course, students will be able to:

1. Define a professional problem
2. Independently solve a practical problem or task
3. Apply acquired knowledge and general competencies gained during studies
4. Apply the methodology of writing professional and scientific works
5. Present research results using multimedia tools
6. Use presentation skills in interpreting research results